Enjoy 360° Vision with the FlyVIZ

Guillermo Andrade, Florian Nouviale, Jerome Ardouin, Eric Marchand, Maud Marchal, Anatole Lécuyer

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Guillermo Andrade B.
Inria

Florian Nouviale
INSA Rennes

Jérôme Ardouin
Realyz

Eric Marchand
Université Rennes 1

Maud Marchal
INSA Rennes

Anatole Lécuyer*
Inria

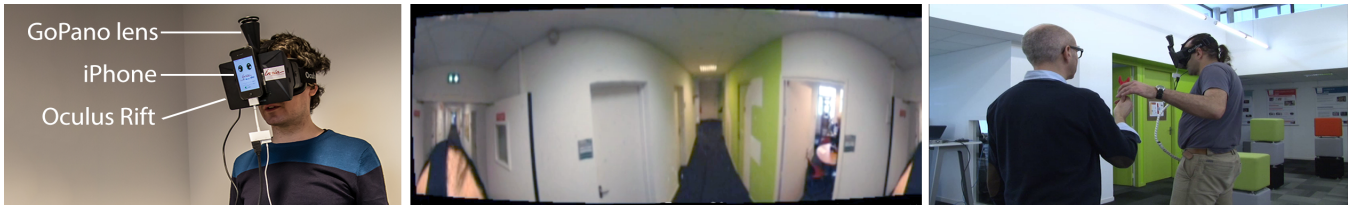

Figure 1: *Our novel FlyVIZ_v2 prototype: (Left) Overview of the system and its main components; (Middle) 360° panoramic image displayed in the HMD when walking in a corridor; (Right) User grabbing an object located outside his natural field-of-view.*

Abstract

FlyVIZ is a novel concept of wearable display device which enables to extend the human field-of-view up to 360°. With the FlyVIZ users can enjoy an artificial omnidirectional vision and see "with eyes behind their back"! The latest version of this approach called "FlyVIZ_v2" that we propose for the SIGGRAPH audience is a novel, compact, and light-weight prototype based on consumer-grade and on-the-shelf components. It assembles: a smartphone, a panoramic mirror, and an Oculus head-mounted-display in order to process a live video stream of the user's surroundings and provide a real-time omnidirectional image. We propose SIGGRAPH attendees to test this unique sensory experience, and this new kind of augmented vision.

Keywords: field-of-view, vision enhancement, image processing

Concepts: •**Computing methodologies** → **Image processing;** •**Hardware** → *Displays and imagers;*

1 Introduction

Several sophisticated optical devices can be used to distort or alter human vision for various purposes. For instance, microscopes and telescopes can magnify small or distant objects. These devices map a small part of the Field-of-View (FoV) to a larger one. This mapping process decreases the natural human FoV. But increasing the natural human FoV is very difficult to achieve with traditional optical devices. Our novel approach called FlyVIZ enables to increase, in real-time, the human FoV up to 360° horizontally [Ardouin et al. 2012].

*e-mail:anatole.lecuyer@inria.fr

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2 The FlyVIZ_v2 Prototype

We propose a novel version of our approach called the FlyVIZ_v2. It is based on affordable and on_the_shelf components. For image acquisition, the FlyVIZ_v2 relies on an iPhone4S smart-phone combined with a GoPano lens that contains a curved mirror enabling the capture of video with 360° horizontal field-of-view. For image transformation, we developed a dedicated software for iPhone that processes the video stream and transforms it into a real-time meaningful representation for the user similarly as in [Ardouin et al. 2012]. Finally for image display, the FlyVIZ_v2 relies on an Oculus DK1 head-mounted display worn by the user. A battery (XTORM 11000mAh power bank) that can be easily attached to the clothes of the user can feed both the iPhone and the Oculus. The resulting power supply of the prototype can last up to 6 hours.

3 Demonstration of the FlyVIZ_v2

We invite the SIGGRAPH audience to experience the unique omnidirectional vision provided by the FlyVIZ_v2. After a very short installation (hooking the power supply up to the hips and putting on the HMD equipped with a washable vrcover for hygiene purpose), the user wearing one of our prototype will become rapidly able to achieve various tasks: a) localizing and identifying objects located all around the user, e.g. counting fingers from the hand of a second participant located behind the main user; b) grabbing objects, e.g. a stick or a ball, which are presented in the front, the sides or even the back of the user; or c) walking forward and backward in presence of tall obstacles. The fast version of this demo can last less than 2 minutes. Wearing the FlyVIZ and experiencing a 360° vision was always found a fun and teasing sensory experience. Such augmented human capacity and extended field-of-view could benefit in various applications such as research in perception and neuroscience, surveillance, security, entertainment, or assistance to disabled people. A patent has been filled out on the FlyVIZ system.

References

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